

SEQUENCE LISTING

<110> TAKAKURA, Hikaru
 MORISHITA, Mio
 SHIMOJO, Tomoko
 ASADA, Kiyozo
 KATO, Ikunoshin

<120> SYSTEM FOR EXPRESSING HYPERTHERMOSTABLE

<130> TAKAKURA=6

<140> 09/445,472
 <141> 1999-12-08

<150> 151969/1997
 <151> 1997-06-10

<160> 33

<170> PatentIn version 3.0

<210> 1
 <211> 412
 <212> PRT
 <213> Pyrococcus furiosus

<400> 1

Ala Glu Leu Glu Gly Leu Asp Glu Ser Ala Ala Gln Val Met Ala Thr
 1 5 10 15
 Tyr Val Trp Asn Leu Gly Tyr Asp Gly Ser Gly Ile Thr Ile Gly Ile
 20 25 30
 Ile Asp Thr Gly Ile Asp Ala Ser His Pro Asp Leu Gln Gly Lys Val
 35 40 45
 Ile Gly Trp Val Asp Phe Val Asn Gly Arg Ser Tyr Pro Tyr Asp Asp
 50 55 60
 His Gly His Gly Thr His Val Ala Ser Ile Ala Ala Gly Thr Gly Ala
 65 70 75 80
 Ala Ser Asn Gly Lys Tyr Lys Gly Met Ala Pro Gly Ala Lys Leu Ala
 85 90 95
 Gly Ile Lys Val Leu Gly Ala Asp Gly Ser Gly Ser Ile Ser Thr Ile
 100 105 110
 Ile Lys Gly Val Glu Trp Ala Val Asp Asn Lys Asp Lys Tyr Gly Ile
 115 120 125
 Lys Val Ile Asn Leu Ser Leu Gly Ser Ser Gln Ser Ser Asp Gly Thr
 130 135 140
 Asp Ala Leu Ser Gln Ala Val Asn Ala Ala Trp Asp Ala Gly Leu Val
 145 150 155 160
 Val Val Val Ala Ala Gly Asn Ser Gly Pro Asn Lys Tyr Thr Ile Gly
 165 170 175
 Ser Pro Ala Ala Ala Ser Lys Val Ile Thr Val Gly Ala Val Asp Lys

```
<210> 2
<211> 1236
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 2
gcagaattag aaggactgga tgagtctgca gctcaagtta tggcaactta cgtttggaac 60
ttgggatgatg atggtttctgg aatcacaaata ggaataattg acactggaat tgacgcttct 120
catccagatc tccaaggaaa agtaattggg tgggtagatt ttgtcaatgg taggagttat 180
ccatacgcgat accatggaca tggaaactcat gtacgttcaa tagcagctgg tactggagca 240
gcaagtaatg gcaagtacaa gggaatgqct ccaqgaqcta agctgqcqcg aattaagqtt 300
```

ctaggtgccg atggttcttg aagcatatct actataatta agggagttga gtgggccggt 360
gataacaaag ataagtacgg aattaaggtc attaatcttt ctcttggttc aagccagagc 420
tcagatggta ctgacgtctc aagtcaggct gttaatgcag cgtgggatgc tggattagtt 480
gttgtggttg ccgctggaaa cagtggacct aacaagtata caatcggttc tccagcagct 540
gcaagcaaag ttattacagt tggagccgtt gacaagtatg atgttataac aagcttctca 600
agcagagggc caactgcaga cggcaggcct aagcctgagg ttgtgtctcc agggaaactgg 660
ataattgctg ccagagcaag tggaaactagc atgggtcaac caattaatga ctattacaca 720
gcagctcctg ggacatcaat ggcaactcct cacgtagctg gtattgcagc cctcttgctc 780
caagcacacc cgagctggac tccagacaaa gtaaaaacag ccctcataga aactgtgat 840
atcgtaaagc cagatgaaat agccgatata gcctacggtg caggtagggt taatgcatac 900
aaggctataa actacgataa ctatgcaaag ctagtgttca ctggatatgt tgccaacaaa 960
ggcagccaaa ctaccacgtt cgttattagc ggagcttcgt tcgtaactgc cacattatac 1020
tgggacaatg ccaatagcga ccttgatctt tacctctacg atcccaatgg aaaccagggt 1080
gactactctt acaccgccta ctatggattc gaaaagggtg gttattacaa cccaactgat 1140
ggaacatgga caattaagggt tgtaagctac agcgggaagtg caaactatca agtagatgtg 1200
gtaagtgatg gttcccttc acagcctgga agttca 1236

<210> 3
<211> 29
<212> PRT
<213> *Bacillus subtilis*

<400> 3

Met Arg Ser Lys Lys Leu Trp Ile Ser Leu Leu Phe Ala Leu Thr Leu
1 5 10 15
Ile Phe Thr Met Ala Phe Ser Asn Met Ser Ala Gln Ala
20 25

<210> 4
<211> 522
<212> PRT
<213> *Pyrococcus furiosus*

<220>
<221> misc_feature
<222> (428)..(428)
<223> Xaa at position 428 is Gly or Val.

<400> 4

Ala Glu Leu Glu Gly Leu Asp Glu Ser Ala Ala Gln Val Met Ala Thr
1 5 10 15
Tyr Val Trp Asn Leu Gly Tyr Asp Gly Ser Gly Ile Thr Ile Gly Ile

20 25 30
 Ile Asp Thr Gly Ile Asp Ala Ser His Pro Asp Leu Gln Gly Lys Val
 35 40 45
 Ile Gly Trp Val Asp Phe Val Asn Gly Arg Ser Tyr Pro Tyr Asp Asp
 50 55 60
 His Gly His Gly Thr His Val Ala Ser Ile Ala Ala Gly Thr Gly Ala
 65 70 75 80
 Ala Ser Asn Gly Lys Tyr Lys Gly Met Ala Pro Gly Ala Lys Leu Ala
 85 90 95
 Gly Ile Lys Val Leu Gly Ala Asp Gly Ser Gly Ser Ile Ser Thr Ile
 100 105 110
 Ile Lys Gly Val Glu Trp Ala Val Asp Asn Lys Asp Lys Tyr Gly Ile
 115 120 125
 Lys Val Ile Asn Leu Ser Leu Gly Ser Ser Gln Ser Ser Asp Gly Thr
 130 135 140
 Asp Ala Leu Ser Gln Ala Val Asn Ala Ala Trp Asp Ala Gly Leu Val
 145 150 155 160
 Val Val Val Ala Ala Gly Asn Ser Gly Pro Asn Lys Tyr Thr Ile Gly
 165 170 175
 Ser Pro Ala Ala Ala Ser Lys Val Ile Thr Val Gly Ala Val Asp Lys
 180 185 190
 Tyr Asp Val Ile Thr Ser Phe Ser Ser Arg Gly Pro Thr Ala Asp Gly
 195 200 205
 Arg Leu Lys Pro Glu Val Val Ala Pro Gly Asn Trp Ile Ile Ala Ala
 210 215 220
 Arg Ala Ser Gly Thr Ser Met Gly Gln Pro Ile Asn Asp Tyr Tyr Thr
 225 230 235 240
 Ala Ala Pro Gly Thr Ser Met Ala Thr Pro His Val Ala Gly Ile Ala
 245 250 255
 Ala Leu Leu Leu Gln Ala His Pro Ser Trp Thr Pro Asp Lys Val Lys
 260 265 270
 Thr Ala Leu Ile Glu Thr Ala Asp Ile Val Lys Pro Asp Glu Ile Ala
 275 280 285
 Asp Ile Ala Tyr Gly Ala Gly Arg Val Asn Ala Tyr Lys Ala Ile Asn
 290 295 300
 Tyr Asp Asn Tyr Ala Lys Leu Val Phe Thr Gly Tyr Val Ala Asn Lys
 305 310 315 320
 Gly Ser Gln Thr His Gln Phe Val Ile Ser Gly Ala Ser Phe Val Thr
 325 330 335
 Ala Thr Leu Tyr Trp Asp Asn Ala Asn Ser Asp Leu Asp Leu Tyr Leu
 340 345 350
 Tyr Asp Pro Asn Gly Asn Gln Val Asp Tyr Ser Tyr Thr Ala Tyr Tyr

```

      355              360              365
Gly Phe Glu Lys Val Gly Tyr Tyr Asn Pro Thr Asp Gly Thr Trp Thr
  370              375              380
Ile Lys Val Val Ser Tyr Ser Gly Ser Ala Asn Tyr Gln Val Asp Val
  385              390              395              400
Val Ser Asp Gly Ser Leu Ser Gln Pro Gly Ser Ser Pro Ser Pro Gln
      405              410              415
Pro Glu Pro Thr Val Asp Ala Lys Thr Phe Gln Xaa Ser Asp His Tyr
      420              425              430
Tyr Tyr Asp Arg Ser Asp Thr Phe Thr Met Thr Val Asn Ser Gly Ala
      435              440              445
Thr Lys Ile Thr Gly Asp Leu Val Phe Asp Thr Ser Tyr His Asp Leu
      450              455              460
Asp Leu Tyr Leu Tyr Asp Pro Asn Gln Lys Leu Val Asp Arg Ser Glu
      465              470              475              480
Ser Pro Asn Ser Tyr Glu His Val Glu Tyr Leu Thr Pro Ala Pro Gly
      485              490              495
Thr Trp Tyr Phe Leu Val Tyr Ala Tyr Tyr Thr Tyr Gly Trp Ala Tyr
      500              505              510
Tyr Glu Leu Thr Ala Lys Val Tyr Tyr Gly
      515              520

```

```

<210> 5
<211> 4765
<212> DNA
<213> Artificial

```

```

<220>
<223> Synthetic

```

```

<400> 5
tttaaattat aagatataat cactccgagt gatgagtaag atacatcatt acagtcccaa      60
aatgtttata attggaacgc agtgaatata caaaatgaat ataacctcgg aggtgactgt      120
agaatgaata agaagggact tactgtgcta tttatagcga taatgctcct ttcatagatt      180
ccagtgcact ttgtgtccgc agaaacacca cgggttagtt cagaaaaattc aacaacttot      240
atactcccta accaacaagt tgtgacaaaa gaagtttcac aagcggcgct taatgctata      300
atgaaaggac aacccaacat ggttcttata atcaagacta aggaaggcaa acttgaagag      360
gcaaaaaaccg agcttgaaaa gctaggtgca gagattcttg acgaaaaatg agttcttaac      420
atgttgctag ttaagattaa gcctgagaaa gttaaagagc tcaactatat ctcattcttt      480
gaaaaagcct ggcttaacag agaagttaag ctttcccctc caattgtcga aaaggacgtc      540
aagactaagg agccctccct agaaccaaaa atgtataaca gcacctgggt aattaatgct      600
ctccagttca tccaggaatt tggatatgat ggtagtggtg ttgtgtgtgc agtacttgac      660

```

acgggaggttg atccgaacca tcctttcttg agcataactc cagatggagc caggaaaatt	720
atagaatgga aggattttac agacgaggga ttcgtggata catcattcag ctttagcaag	780
gttgtaaatg ggactcttat aattaacaca acattccaag tggcctcagg tctcacgctg	840
aatgaatcga caggacttat ggaatacgtt gttaagactg tttacgtgag caatgtgacc	900
attggaaata tcacttctgc taatggcatc tatcacttgc gcctgctccc agaaagatac	960
ttcgacttaa acttcgatgg tgatcaagag gactctatc ctgtcttatt agttaactcc	1020
actggcaatg gttatgacat tgcataatgt gatactgacc ttgactacga cttcaccgac	1080
gaagttccac ttggccagta caacgttact tatgatgttg ctgtttttag ctactactac	1140
ggctcttca actacgtgct tgcagaaata gatcotaacg gagaatatgc agtatttggg	1200
tgggatggtc acggtcacgg aactcacgta gctggaactg ttgctggta cgacagcaac	1260
aatgatgctt gggattggct cagtatgtac tctggatgaat gggaagtgtt ctcaagactc	1320
tatggttggg attatacgaa cgtaaccaca gacacgtgc aggggtgttc tccaggtgcc	1380
caaataatgg caataagagt tcttaggagt gatggacggg gtatgatgtg ggatattata	1440
gaaggtatga catacgacg aacctatggt gcagacgtta taagcatgag tctcgttgga	1500
aatgctccat acttagatgg tactgatcca gaaagcgttg ctgtggatga gcttaccgaa	1560
aagtacggtg ttgtattcgt aatagctgca ggaatgaag gtcctggcat taacatcgtt	1620
ggaagtctg gtgttgcaac aaaggcaata actgttggag ctgctgcagt gccattaac	1680
gttgaggttt atgtttccca agcacttgga tatcctgatt actatgatt ctattacttc	1740
ccgcctaca caaacgttag aatagcattc ttctcaagca gagggccgag aatagatggt	1800
gaaataaaac ccaatgtagt ggctccaggt tacggaattt actcatccct gccgatgtg	1860
attggcggag ctgacttcat gtctggaact tcgatggcta ctccacatgt cagcgggtgc	1920
gttgactcc tcataagcgg ggcaaaggcc gaggaatat actacaatcc agatataatt	1980
aagaaggttc ttgagagcgg tgcaacctgg cttgagggag atccatatac tgggcagaag	2040
tacactgagc ttgaccaagg tcattggtctt gttaacgtta ccaagtctg ggaatcctt	2100
aaggctataa acggcaccac tctccaatt gttagtoact gggcagaca gtctctacgc	2160
gactttgcgg agtacttggg tgtggacgtt ataagaggtc tctacgcaag gaactctata	2220
cctgacattg tcgagtggca cattaagtac gtatgggaca cggagtacag aacttttgag	2280
atctatgcaa ctgagccatg gattaagcct tttgtcagtg gaagtgtaat tctagagaac	2340
aataccgagt ttgtccttag ggtgaaatat gatgtagagg gtcttgagcc aggtctctat	2400
gttggaagga taatcattga tcatcaaca acgccagtta ttgaagacga gatcttgaa	2460
acaattgtta ttcccagaa gtctactcct gagaacaatt acacctcacc ctggtatgat	2520
attaatggtc cagaaatggt gactcaccac ttcttactg tgctgaggg agtggaaggt	2580

ctctacgcga tgaccacata ctgggactac ggtctgtaca gaccagatgg aatgtttgtg 2640
 ttcccatacc agctagatta tcttcccgtc gcagtctcaa atccaatgcc tggaaactgg 2700
 gagctagtat ggactggatt taactttgca cccctctatg agtggggtt ccttgtaagg 2760
 atttacggag tagagataac tccaagcggt tggtagatta acaggacata ccttgacact 2820
 aacactgaat tctcaattga attcaatatt actaacatct atgccccaat taatgcaact 2880
 ctaatcccca ttggccttgg aacctacaat gcgagcggtg aaagcggttg tgatggagag 2940
 ttcttataaa agggcattga agttcctgaa ggcaccgcag agttgaagat taggataggc 3000
 aaccaagtg ttccgaattc agatctagac ttgtaccttt atgacagtaa aggcaattta 3060
 gtggccctag atggaaaccc aacagcagaa gaagagggtg tagttgagta tcctaagcct 3120
 ggagtttatt caatagtagt acatggttac agcgtcaggg acgaaaaatg taatccaacg 3180
 acaaccacct ttgacttagt tgttcaaatg acccttgata atggaaacat aaagcttgac 3240
 aaagactcga ttattcttgg aagcaatgaa agcgtagttg taactgcaaa cataacaatt 3300
 gatagagatc atcctacagg agtatactct ggtatcatag agattagaga taatgaggtc 3360
 taccaggata caaatacttc aattgcgaaa ataccataa ctttggtaat tgacaaggcg 3420
 gactttgcg ttggtctcac accagcagag ggagtacttg gagaggctag aaattacact 3480
 ctaattgtaa agcatgcctc aactacagag cctgtgccaa atgctacagt gattatagga 3540
 aactacacct acctcacaga cgaaaacggt acagtacatc tcacgtatgc tccaactaag 3600
 ttaggcagtg atgaaatcac agtcatagtt aagaaagaga acttcaacac attagagaag 3660
 accttccaaa tcacagtatc agagcctgaa ataactgaag aggacataaa tgagcccaag 3720
 cttgcaatgt catcaccaga agcaaatgct acctagatat cagttgagat ggagagttag 3780
 ggtggcggtta aaaagacagt gacagtggaa ataactataa acggaaccgc taatgagact 3840
 gcaacaatag tggttcctgt tcctaagaag gccgaaaaca tcgaggttaag tggagaccac 3900
 gtaatttcct atagtataga ggaaggagag tacgccaaat acgttataat tacagtgaa 3960
 tttgcatcac ctgtaacagt aactgttact tacactatct atgctggccc aagagcttca 4020
 atcttgacac ttaacttctc tggctactca tggtagagac tatattcaca gaagtttgac 4080
 gaattgtacc aaaaggccct tgaattggga gtggacaacg agacattagc tttagccctc 4140
 agctaccatg aaaaagccaa agagtactac gaaaaggccc ttgagcttag cgagggttaac 4200
 ataatccaat accttggaga cataagacta ttacctccat taagacaggc atacatcaat 4260
 gaaatgaagg cagttaagat actggaaaaa gccatagaag aattagaggg tgaagagtaa 4320
 tctccaattt ttcccacttt ttcttttata acattccaag ccttttctta gcttcttcgc 4380
 tcattctatc aggagtccat ggaggatcaa aggttaagtc aacctccaca tctcttactc 4440

ctgggatttc gactactttc tctctacag ctctaagaag ccagagagtt aaaggacacc 4500
 caggagttgt cattgtcatc tttatatata cggttttgtc aggattaatc tttagtcat 4560
 aaattaatcc aaggtttaca acatccatcc caattttctgg gtcgataacc tcttttagct 4620
 tttccagaat cattttctca gtaatttcaa ggtttctcatc tttggtttct ctcacaaacc 4680
 caattttcaac ctgcctgata cttttctaact ccctaagctt gttatatatc tccaaaagag 4740
 tggcatcatc aattttctct ttaaa 4765

<210> 6
 <211> 1398
 <212> PRT
 <213> *Pyrococcus furiosus*

<400> 6

Met Asn Lys Lys Gly Leu Thr Val Leu Phe Ile Ala Ile Met Leu Leu
 1 5 10 15
 Ser Val Val Pro Val His Phe Val Ser Ala Glu Thr Pro Pro Val Ser
 20 25 30
 Ser Glu Asn Ser Thr Thr Ser Ile Leu Pro Asn Gln Gln Val Val Thr
 35 40 45
 Lys Glu Val Ser Gln Ala Ala Leu Asn Ala Ile Met Lys Gly Gln Pro
 50 55 60
 Asn Met Val Leu Ile Ile Lys Thr Lys Glu Gly Lys Leu Glu Glu Ala
 65 70 75 80
 Lys Thr Glu Leu Glu Lys Leu Gly Ala Glu Ile Leu Asp Glu Asn Arg
 85 90 95
 Val Leu Asn Met Leu Leu Val Lys Ile Lys Pro Glu Lys Val Lys Glu
 100 105 110
 Leu Asn Tyr Ile Ser Ser Leu Glu Lys Ala Trp Leu Asn Arg Glu Val
 115 120 125
 Lys Leu Ser Pro Pro Ile Val Glu Lys Asp Val Lys Thr Lys Glu Pro
 130 135 140
 Ser Leu Glu Pro Lys Met Tyr Asn Ser Thr Trp Val Ile Asn Ala Leu
 145 150 155 160
 Gln Phe Ile Gln Glu Phe Gly Tyr Asp Gly Ser Gly Val Val Val Ala
 165 170 175
 Val Leu Asp Thr Gly Val Asp Pro Asn His Pro Phe Leu Ser Ile Thr
 180 185 190
 Pro Asp Gly Arg Arg Lys Ile Ile Glu Trp Lys Asp Phe Thr Asp Glu
 195 200 205
 Gly Phe Val Asp Thr Ser Phe Ser Phe Ser Lys Val Val Asn Gly Thr
 210 215 220
 Leu Ile Ile Asn Thr Thr Phe Gln Val Ala Ser Gly Leu Thr Leu Asn

225 230 235 240
 Glu Ser Thr Gly Leu Met Glu Tyr Val Val Lys Thr Val Tyr Val Ser
 245 250 255
 Asn Val Thr Ile Gly Asn Ile Thr Ser Ala Asn Gly Ile Tyr His Phe
 260 265 270
 Gly Leu Leu Pro Glu Arg Tyr Phe Asp Leu Asn Phe Asp Gly Asp Gln
 275 280 285
 Glu Asp Phe Tyr Pro Val Leu Leu Val Asn Ser Thr Gly Asn Gly Tyr
 290 295 300
 Asp Ile Ala Tyr Val Asp Thr Asp Leu Asp Tyr Asp Phe Thr Asp Glu
 305 310 315 320
 Val Pro Leu Gly Gln Tyr Asn Val Thr Tyr Asp Val Ala Val Phe Ser
 325 330 335
 Tyr Tyr Tyr Gly Pro Leu Asn Tyr Val Leu Ala Glu Ile Asp Pro Asn
 340 345
 Gly Glu Tyr Ala Val Phe Gly Trp Asp Gly His Gly His Gly Thr His
 355 360 365
 Val Ala Gly Thr Val Ala Gly Tyr Asp Ser Asn Asn Asp Ala Trp Asp
 370 375 380
 Trp Leu Ser Met Tyr Ser Gly Glu Trp Glu Val Phe Ser Arg Leu Tyr
 385 390 395 400
 Gly Trp Asp Tyr Thr Asn Val Thr Thr Asp Thr Val Gln Gly Val Ala
 405 410 415
 Pro Gly Ala Gln Ile Met Ala Ile Arg Val Leu Arg Ser Asp Gly Arg
 420 425 430
 Gly Ser Met Trp Asp Ile Ile Glu Gly Met Thr Tyr Ala Ala Thr His
 435 440 445
 Gly Ala Asp Val Ile Ser Met Ser Leu Gly Gly Asn Ala Pro Tyr Leu
 450 455 460
 Asp Gly Thr Asp Pro Glu Ser Val Ala Val Asp Glu Leu Thr Glu Lys
 465 470 475 480
 Tyr Gly Val Val Phe Val Ile Ala Ala Gly Asn Glu Gly Pro Gly Ile
 485 490 495
 Asn Ile Val Gly Ser Pro Gly Val Ala Thr Lys Ala Ile Thr Val Gly
 500 505 510
 Ala Ala Ala Val Pro Ile Asn Val Gly Val Tyr Val Ser Gln Ala Leu
 515 520 525
 Gly Tyr Pro Asp Tyr Tyr Gly Phe Tyr Tyr Phe Pro Ala Tyr Thr Asn
 530 535 540
 Val Arg Ile Ala Phe Phe Ser Ser Arg Gly Pro Arg Ile Asp Gly Glu
 545 550 555 560
 Ile Lys Pro Asn Val Val Ala Pro Gly Tyr Gly Ile Tyr Ser Ser Leu

565 570 575
 Pro Met Trp Ile Gly Gly Ala Asp Phe Met Ser Gly Thr Ser Met Ala
 580 585 590
 Thr Pro His Val Ser Gly Val Val Ala Leu Leu Ile Ser Gly Ala Lys
 595 600 605
 Ala Glu Gly Ile Tyr Tyr Asn Pro Asp Ile Ile Lys Lys Val Leu Glu
 610 615 620
 Ser Gly Ala Thr Trp Leu Glu Gly Asp Pro Tyr Thr Gly Gln Lys Tyr
 625 630 635 640
 Thr Glu Leu Asp Gln Gly His Gly Leu Val Asn Val Thr Lys Ser Trp
 645 650 655
 Glu Ile Leu Lys Ala Ile Asn Gly Thr Thr Leu Pro Ile Val Asp His
 660 665 670
 Trp Ala Asp Lys Ser Tyr Ser Asp Phe Ala Glu Tyr Leu Gly Val Asp
 675 680 685
 Val Ile Arg Gly Leu Tyr Ala Arg Asn Ser Ile Pro Asp Ile Val Glu
 690 695 700
 Trp His Ile Lys Tyr Val Gly Asp Thr Glu Tyr Arg Thr Phe Glu Ile
 705 710 715 720
 Tyr Ala Thr Glu Pro Trp Ile Lys Pro Phe Val Ser Gly Ser Val Ile
 725 730 735
 Leu Glu Asn Asn Thr Glu Phe Val Leu Arg Val Lys Tyr Asp Val Glu
 740 745 750
 Gly Leu Glu Pro Gly Leu Tyr Val Gly Arg Ile Ile Ile Asp Asp Pro
 755 760 765
 Thr Thr Pro Val Ile Glu Asp Glu Ile Leu Asn Thr Ile Val Ile Pro
 770 775 780
 Glu Lys Phe Thr Pro Glu Asn Asn Tyr Thr Leu Thr Trp Tyr Asp Ile
 785 790 795 800
 Asn Gly Pro Glu Met Val Thr His His Phe Thr Val Pro Glu Gly
 805 810 815
 Val Asp Val Leu Tyr Ala Met Thr Thr Tyr Trp Asp Tyr Gly Leu Tyr
 820 825 830
 Arg Pro Asp Gly Met Phe Val Phe Pro Tyr Gln Leu Asp Tyr Leu Pro
 835 840 845
 Ala Ala Val Ser Asn Pro Met Pro Gly Asn Trp Glu Leu Val Trp Thr
 850 855 860
 Gly Phe Asn Phe Ala Pro Leu Tyr Glu Ser Gly Phe Leu Val Arg Ile
 865 870 875 880
 Tyr Gly Val Glu Ile Thr Pro Ser Val Trp Tyr Ile Asn Arg Thr Tyr
 885 890 895
 Leu Asp Thr Asn Thr Glu Phe Ser Ile Glu Phe Asn Ile Thr Asn Ile

```

          900              905              910
Tyr Ala Pro Ile Asn Ala Thr Leu Ile Pro Ile Gly Leu Gly Thr Tyr
  915              920              925
Asn Ala Ser Val Glu Ser Val Gly Asp Gly Glu Phe Phe Ile Lys Gly
  930              935              940
Ile Glu Val Pro Glu Gly Thr Ala Glu Leu Lys Ile Arg Ile Gly Asn
  945              950              955              960
Pro Ser Val Pro Asn Ser Asp Leu Asp Leu Tyr Leu Tyr Asp Ser Lys
              965              970              975
Gly Asn Leu Val Ala Leu Asp Gly Asn Pro Thr Ala Glu Glu Glu Val
              980              985              990
Val Val Glu Tyr Pro Lys Pro Gly Val Tyr Ser Ile Val Val His Gly
  995              1000              1005
Tyr Ser Val Arg Asp Glu Asn Gly Asn Pro Thr Thr Thr Thr Phe
  1010              1015              1020
Asp Leu Val Val Gln Met Thr Leu Asp Asn Gly Asn Ile Lys Leu
  1025              1030              1035
Asp Lys Asp Ser Ile Ile Leu Gly Ser Asn Glu Ser Val Val Val
  1040              1045              1050
Thr Ala Asn Ile Thr Ile Asp Arg Asp His Pro Thr Gly Val Tyr
  1055              1060              1065
Ser Gly Ile Ile Glu Ile Arg Asp Asn Glu Val Tyr Gln Asp Thr
  1070              1075              1080
Asn Thr Ser Ile Ala Lys Ile Pro Ile Thr Leu Val Ile Asp Lys
  1085              1090              1095
Ala Asp Phe Ala Val Gly Leu Thr Pro Ala Glu Gly Val Leu Gly
  1100              1105              1110
Glu Ala Arg Asn Tyr Thr Leu Ile Val Lys His Ala Leu Thr Leu
  1115              1120              1125
Glu Pro Val Pro Asn Ala Thr Val Ile Ile Gly Asn Tyr Thr Tyr
  1130              1135              1140
Leu Thr Asp Glu Asn Gly Thr Val Thr Phe Thr Tyr Ala Pro Thr
  1145              1150              1155
Lys Leu Gly Ser Asp Glu Ile Thr Val Ile Val Lys Lys Glu Asn
  1160              1165              1170
Phe Asn Thr Leu Glu Lys Thr Phe Gln Ile Thr Val Ser Glu Pro
  1175              1180              1185
Glu Ile Thr Glu Glu Asp Ile Asn Glu Pro Lys Leu Ala Met Ser
  1190              1195              1200
Ser Pro Glu Ala Asn Ala Thr Ile Val Ser Val Glu Met Glu Ser
  1205              1210              1215
Glu Gly Gly Val Lys Lys Thr Val Thr Val Glu Ile Thr Ile Asn

```

```

1220          1225          1230
Gly Thr  Ala Asn Glu Thr  Ala  Thr Ile Val Val Pro  Val Pro Lys
1235          1240          1245

Lys Ala  Glu Asn Ile Glu Val  Ser Gly Asp His Val  Ile Ser Tyr
1250          1255          1260

Ser Ile  Glu Glu Gly Glu Tyr  Ala Lys Tyr Val Ile  Ile Thr Val
1265          1270          1275

Lys Phe  Ala Ser Pro Val Thr  Val Thr Val Thr Tyr  Thr Ile Tyr
1280          1285          1290

Ala Gly  Pro Arg Val Ser Ile  Leu Thr Leu Asn Phe  Leu Gly Tyr
1295          1300          1305

Ser Trp  Tyr Arg Leu Tyr Ser  Gln Lys Phe Asp Glu  Leu Tyr Gln
1310          1315          1320

Lys Ala  Leu Glu Leu Gly Val  Asp Asn Glu Thr Leu  Ala Leu Ala
1325          1330          1335

Leu Ser  Tyr His Glu Lys Ala  Lys Glu Tyr Tyr Glu  Lys Ala Leu
1340          1345          1350

Glu Leu  Ser Glu Gly Asn Ile  Ile Gln Tyr Leu Gly  Asp Ile Arg
1355          1360          1365

Leu Leu  Pro Pro Leu Arg Gln  Ala Tyr Ile Asn Glu  Met Lys Ala
1370          1375          1380

Val Lys  Ile Leu Glu Lys Ala  Ile Glu Glu Leu Glu  Gly Glu Glu
1385          1390          1395

```

```

<210> 7
<211> 35
<212> DNA
<213> Artificial

```

```

<220>
<223> Synthetic

```

```

<400> 7
ggwwsdrtrtg ttrrhgthgc dgtmdtygac acbgg

```

35

```

<210> 8
<211> 32
<212> DNA
<213> Artificial

```

```

<220>
<223> Synthetic

```

```

<400> 8
kstcacggaa ctcacgtgdc bgghacdgtt gc

```

32

```

<210> 9
<211> 33
<212> DNA
<213> Artificial

```

<220>
 <223> Synthetic

 <400> 9
 ascmgcaach gtkccvgha cgtgagttcc gtg 33

 <210> 10
 <211> 34
 <212> DNA
 <213> Artificial

 <220>
 <223> Synthetic

 <400> 10
 chccgsyvac rtgbbgagwd gccatbgavg tdcc 34

 <210> 11
 <211> 1977
 <212> DNA
 <213> Artificial

 <220>
 <223> Synthetic

 <400> 11
 atgaagaggt taggtgctgt ggtgctggca ctggtgctcg tgggtcttct ggccggaaacg 60
 gcccttgctgg cacccgtaaa accggttgct aggaacaacg cggttcagca gaagaactac 120
 ggactgctga ccccgggact gttcaagaaa gtccagagga tgaactggaa ccaggaagtg 180
 gacaccgtca taatgttcgg gagctacgga gacagggaca gggcggttaa ggtactgagg 240
 ctcatgggcg cccaggtcaa gtactcctac aagataatcc ctgctgctcg ggttaaaata 300
 aaggccaggg accttctgct gatcgcgggc atgatataga cgggttactt cggttaacaca 360
 agggctctcg gcataaagtt catacaggag gattacaagg ttcagggtga cgacgccact 420
 tccgtctccc agatagggcg cgataccgtc tggaaactccc tcggctacga cggaagcggt 480
 gtgggtggtg ccactgctga tacgggtata gacgcgaacc accccgatct gaaggccaag 540
 gtcataggct ggtacgagcg cgtcaacggc aggtcgaccc cctacgatga ccagggaacac 600
 ggaaaccaag ttgcgggtat cgttgccgga accggcagcg ttaactccca gtacatagcg 660
 gtcgcccccg ggcggaagct cgtcgcgctc aaggttctcg gtgccgacgg ttcgggaagc 720
 gtctccacca tcactcgagg tgttgactgg gtogtccaga acaaggacaa gtacgggata 780
 agggctcatc acctctcctt cggctcctcc cagagctccg acggaaccga ctccctcagt 840
 caggccgtca acaagccctg ggacgcgggt atagtagtct cgtgcgcccg cggaacacgc 900
 gggccgaaca cctacaccgt cggctcaccg gccgcccgga gcaaggtcat aaccgtcggt 960
 gcagttgaca gcaacgacaa catcgccagc ttctccagca ggggaccgac cgcggacgga 1020

agggtcaagc cggaagtcgt cgcccccggc gttgacatca tagccccgcg cgccagcgga 1080
 accagcatgg goaccccgat aaacgactac tacaccaagg cctctggaac cagcatggcc 1140
 accccgcacg tttcggggcgt tggcgcgctc atcctccagg cccaccgcag ctggaccccg 1200
 gacaaggatga agaccgccct catcgagacc gccgacatag tcgcccccaa ggagatagcg 1260
 gacatcgctt acgggtcgggg taggggtgaac gtctacaagg ccatcaagta cgacgactac 1320
 gccaaagtca ccttcaccgg ctocgtcgcc gacaaggaa gcgccaccca caccttcgac 1380
 gtcagcggcg ccacettcgt gaccgccacc ctctactggg acacgggctc gagcgacatc 1440
 gacotctacc tctacgaccc caacgggaac gaggttgact actctacac gcgctactac 1500
 ggcttcgaga aggtcgcgcta ctacaacccg accgcggaa cctggacggt caaggctcgtc 1560
 agctacaagg gcgcggcgaa ctaccaggtc gacgtcgtca gcgacgggag cctcagccag 1620
 tcggcgggcg gcaacccgaa tccaaacccc aaccggaacc caaccccgac caccgacacc 1680
 cagaccttca cgggttcggt taacgactac tgggacacca gcgacacctt caccatgaac 1740
 gtcaacagcg gtgccaccaa gataaccggt gacctgacct tcgatacttc ctacaacgac 1800
 ctgcacctct acctctacga ccccaacggc aacctcggtg acaggtccac gtcgagcaac 1860
 agctacgagc acgtcgagta cgccaacccc gccccgggaa cctggaagtt cctcgtctac 1920
 gcctacagca cctacggctg ggcgagactac cagctcaagg cctcgtctta ctacggg 1977

<210> 12
 <211> 659
 <212> PRT
 <213> Thermococcus celer

<400> 12

Met Lys Arg Leu Gly Ala Val Val Leu Ala Leu Val Leu Val Gly Leu
 1 5 10 15
 Leu Ala Gly Thr Ala Leu Ala Ala Pro Val Lys Pro Val Val Arg Asn
 20 25 30
 Asn Ala Val Gln Gln Lys Asn Tyr Gly Leu Leu Thr Pro Gly Leu Phe
 35 40 45
 Lys Lys Val Gln Arg Met Asn Trp Asn Gln Glu Val Asp Thr Val Ile
 50 55 60
 Met Phe Gly Ser Tyr Gly Asp Arg Asp Arg Ala Val Lys Val Leu Arg
 65 70 75 80
 Leu Met Gly Ala Gln Val Lys Tyr Ser Tyr Lys Ile Ile Pro Ala Val
 85 90 95
 Ala Val Lys Ile Lys Ala Arg Asp Leu Leu Ile Ala Gly Met Ile
 100 105 110
 Asp Thr Gly Tyr Phe Gly Asn Thr Arg Val Ser Gly Ile Lys Phe Ile
 115 120 125

Gln Glu Asp Tyr Lys Val Gln Val Asp Asp Ala Thr Ser Val Ser Gln
 130 135 140
 Ile Gly Ala Asp Thr Val Trp Asn Ser Leu Gly Tyr Asp Gly Ser Gly
 145 150 155 160
 Val Val Val Ala Ile Val Asp Thr Gly Ile Asp Ala Asn His Pro Asp
 165 170 175
 Leu Lys Gly Lys Val Ile Gly Trp Tyr Asp Ala Val Asn Gly Arg Ser
 180 185 190
 Thr Pro Tyr Asp Asp Gln Gly His Gly Thr His Val Ala Gly Ile Val
 195 200 205
 Ala Gly Thr Gly Ser Val Asn Ser Gln Tyr Ile Gly Val Ala Pro Gly
 210 215 220
 Ala Lys Leu Val Gly Val Lys Val Leu Gly Ala Asp Gly Ser Gly Ser
 225 230 235 240
 Val Ser Thr Ile Ile Ala Gly Val Asp Trp Val Val Gln Asn Lys Asp
 245 250 255
 Lys Tyr Gly Ile Arg Val Ile Asn Leu Ser Leu Gly Ser Ser Gln Ser
 260 265 270
 Ser Asp Gly Thr Asp Ser Leu Ser Gln Ala Val Asn Asn Ala Trp Asp
 275 280 285
 Ala Gly Ile Val Val Cys Val Ala Ala Gly Asn Ser Gly Pro Asn Thr
 290 295 300
 Tyr Thr Val Gly Ser Pro Ala Ala Ala Ser Lys Val Ile Thr Val Gly
 305 310 315 320
 Ala Val Asp Ser Asn Asp Asn Ile Ala Ser Phe Ser Ser Arg Gly Pro
 325 330 335
 Thr Ala Asp Gly Arg Leu Lys Pro Glu Val Val Ala Pro Gly Val Asp
 340 345 350
 Ile Ile Ala Pro Arg Ala Ser Gly Thr Ser Met Gly Thr Pro Ile Asn
 355 360 365
 Asp Tyr Tyr Thr Lys Ala Ser Gly Thr Ser Met Ala Thr Pro His Val
 370 375 380
 Ser Gly Val Gly Ala Leu Ile Leu Gln Ala His Pro Ser Trp Thr Pro
 385 390 395 400
 Asp Lys Val Lys Thr Ala Leu Ile Glu Thr Ala Asp Ile Val Ala Pro
 405 410 415
 Lys Glu Ile Ala Asp Ile Ala Tyr Gly Ala Gly Arg Val Asn Val Tyr
 420 425 430
 Lys Ala Ile Lys Tyr Asp Asp Tyr Ala Lys Leu Thr Phe Thr Gly Ser
 435 440 445
 Val Ala Asp Lys Gly Ser Ala Thr His Thr Phe Asp Val Ser Gly Ala
 450 455 460

Thr Phe Val Thr Ala Thr Leu Tyr Trp Asp Thr Gly Ser Ser Asp Ile
465 470 475 480

Asp Leu Tyr Leu Tyr Asp Pro Asn Gly Asn Glu Val Asp Tyr Ser Tyr
485 490 495

Thr Ala Tyr Tyr Gly Phe Glu Lys Val Gly Tyr Tyr Asn Pro Thr Ala
500 505 510

Gly Thr Trp Thr Val Lys Val Val Ser Tyr Lys Gly Ala Ala Asn Tyr
515 520 525

Gln Val Asp Val Val Ser Asp Gly Ser Leu Ser Gln Ser Gly Gly Gly
530 535 540

Asn Pro Asn Pro Asn Pro Asn Pro Asn Pro Thr Pro Thr Thr Asp Thr
545 550 555 560

Gln Thr Phe Thr Gly Ser Val Asn Asp Tyr Trp Asp Thr Ser Asp Thr
565 570 575

Phe Thr Met Asn Val Asn Ser Gly Ala Thr Lys Ile Thr Gly Asp Leu
580 585 590

Thr Phe Asp Thr Ser Tyr Asn Asp Leu Asp Leu Tyr Leu Tyr Asp Pro
595 600 605

Asn Gly Asn Leu Val Asp Arg Ser Thr Ser Ser Asn Ser Tyr Glu His
610 615 620

Val Glu Tyr Ala Asn Pro Ala Pro Gly Thr Trp Thr Phe Leu Val Tyr
625 630 635 640

Ala Tyr Ser Thr Tyr Gly Trp Ala Asp Tyr Gln Leu Lys Ala Val Val
645 650 655

Tyr Tyr Gly

<210> 13
<211> 28
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 13
agagggatcc atgaaggggc tgaaagct

28

<210> 14
<211> 30
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 14
agaggcatgc gctctagact ctgggagagt

30

<210> 15
 <211> 1962
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 15
 atgaaggggc tgaagctct catattagtg attttagttc taggttttgg agtagggagc 60
 gtagcggcag ctccagagaa gaaagttgaa caagtaagaa atgttgagaa gaactatggt 120
 ctgctaagcg caggactgtt cagaaaaatt caaaaattga atcctaacga ggaatcagc 180
 acagtaattg tatttgaaaa ccatagggaa aaagaaattg cagtaagagt tcttgagtta 240
 atgggtgcaa aagttaggtg tgtgtaccat attatacccg caatagctgc cgtacttaag 300
 gttagagact tactagtcac ctacagttta acagggggta aagctaagct ttcagggtgt 360
 aggtttatcc aggaagacta caaagttaca gtttcagcag aattagaagg actggatgag 420
 tctgcagctc aagttatggc aacttacgtt tggaacttgg gatatgatgg ttctggaatc 480
 acaataggaa taattgacac tggaattgac gcttctcacc cagatctcca aggaaaagta 540
 attgggtggg tagattttgt caatggtagg agttatccat acgatgacca tggacatgga 600
 actcatgtag ctccaatagc agctgggtact ggagcagcaa gtaatggcaa gtacaaggga 660
 atggctccag gagctaagct ggccgggaatt aaggttctag gtgccgatgg ttctggaagc 720
 atatctacta taattaaggg agttgagtgg gccgttgata acaaaagataa gtacggaatt 780
 aaggtcatta atctttctct tggttcaagc cagagctcag atggtactga cgctctaagt 840
 caggctgtta atgcagcgtg ggatgctgga ttagtgttg tggttgccgc tggaaaacagt 900
 ggacctaaaca agtatacaat cggttctcca gcagctgcaa gcaaagttat tacagttgga 960
 gccgttgaca agtatgatgt tataacaagc ttctcaagca gagggccaac tgcagacggc 1020
 aggcttaagc ctgaggttgt tgctccagga aactggataa ttgctgccag agcaagtgga 1080
 actagcatgg gtcaaccaat taatgactat tacacagcag ctctctgggac atcaatggca 1140
 actcctcacg tagctgggat tgcagccctc ttgctccaag cacaccgag ctgactcca 1200
 gacaaagtaa aaacagccct catagaaact gctgatatcg taaagccaga tgaaatagcc 1260
 gatatagcct acggtgcagg tagggttaat gcatacaagg ctataaacta cgataactat 1320
 gcaaagctag tgttcaactg atatgttgcc aacaaggca gccaaactca ccagttogtt 1380
 attagcggag ctctgcttgt aactgccaca ttatactggg acaatgccaa tagcgacctt 1440
 gatctttaac tctacgatcc caatggaaac caggttgact actcttacac cgctactat 1500
 ggattcgaaa aggttggtta ttacaacca actgatggaa catggacaat taaggttgta 1560
 agctacagcg gaagtgcata ctatcaagta gatgtggtta gtgatgggtc cctttcacag 1620

cctggaagtt caccatctcc acaaccagaa ccaacagtag acgcaaagac gttccaagga 1680
 tccgatcaact actactatga caggagcgac acctttacaa tgaccgttaa ctctggggct 1740
 acaagatta ctggagacct agtgtttgac acaagctacc atgatcttga cctttacctc 1800
 tacgatccta accagaagct tgtagataga tcggagagtc ccaacagcta cgaacacgta 1860
 gaatacttaa ccccgcccc aggaacctgg tacttcctag tatatgccta ctacacttac 1920
 ggttgggctt actacgagct gacggctaaa gtttattatg gc 1962

<210> 16
 <211> 654
 <212> PRT
 <213> Pyrococcus furiosus

<400> 16

Met Lys Gly Leu Lys Ala Leu Ile Leu Val Ile Leu Val Leu Gly Leu
 1 5 10 15
 Val Val Gly Ser Val Ala Ala Ala Pro Glu Lys Lys Val Glu Gln Val
 20 25 30
 Arg Asn Val Glu Lys Asn Tyr Gly Leu Leu Thr Pro Gly Leu Phe Arg
 35 40 45
 Lys Ile Gln Lys Leu Asn Pro Asn Glu Glu Ile Ser Thr Val Ile Val
 50 55 60
 Phe Glu Asn His Arg Glu Lys Glu Ile Ala Val Arg Val Leu Glu Leu
 65 70 75 80
 Met Gly Ala Lys Val Arg Tyr Val Tyr His Ile Ile Pro Ala Ile Ala
 85 90 95
 Ala Asp Leu Lys Val Arg Asp Leu Leu Val Ile Ser Gly Leu Thr Gly
 100 105 110
 Gly Lys Ala Lys Leu Ser Gly Val Arg Phe Ile Gln Glu Asp Tyr Lys
 115 120 125
 Val Thr Val Ser Ala Glu Leu Glu Gly Leu Asp Glu Ser Ala Ala Gln
 130 135 140
 Val Met Ala Thr Tyr Val Trp Asn Leu Gly Tyr Asp Gly Ser Gly Ile
 145 150 155 160
 Thr Ile Gly Ile Ile Asp Thr Gly Ile Asp Ala Ser His Pro Asp Leu
 165 170 175
 Gln Gly Lys Val Ile Gly Trp Val Asp Phe Val Asn Gly Arg Ser Tyr
 180 185 190
 Pro Tyr Asp Asp His Gly His Gly Thr His Val Ala Ser Ile Ala Ala
 195 200 205
 Gly Thr Gly Ala Ala Ser Asn Gly Lys Tyr Lys Gly Met Ala Pro Gly
 210 215 220

```

Ala Lys Leu Ala Gly Ile Lys Val Leu Gly Ala Asp Gly Ser Gly Ser
225          230          235          240

Ile Ser Thr Ile Ile Lys Gly Val Glu Trp Ala Val Asp Asn Lys Asp
          245          250          255

Lys Tyr Gly Ile Lys Val Ile Asn Leu Ser Leu Gly Ser Ser Gln Ser
          260          265          270

Ser Asp Gly Thr Asp Ala Leu Ser Gln Ala Val Asn Ala Ala Trp Asp
          275          280          285

Ala Gly Leu Val Val Val Val Ala Ala Gly Asn Ser Gly Pro Asn Lys
          290          295          300

Tyr Thr Ile Gly Ser Pro Ala Ala Ala Ser Lys Val Ile Thr Val Gly
305          310          315          320

Ala Val Asp Lys Tyr Asp Val Ile Thr Ser Phe Ser Ser Arg Gly Pro
          325          330          335

Thr Ala Asp Gly Arg Leu Lys Pro Glu Val Val Ala Pro Gly Asn Trp
          340          345          350

Ile Ile Ala Ala Arg Ala Ser Gly Thr Ser Met Gly Gln Pro Ile Asn
          355          360          365

Asp Tyr Tyr Thr Ala Ala Pro Gly Thr Ser Met Ala Thr Pro His Val
          370          375          380

Ala Gly Ile Ala Ala Leu Leu Gln Ala His Pro Ser Trp Thr Pro
385          390          395          400

Asp Lys Val Lys Thr Ala Leu Ile Glu Thr Ala Asp Ile Val Lys Pro
          405          410          415

Asp Glu Ile Ala Asp Ile Ala Tyr Gly Ala Gly Arg Val Asn Ala Tyr
          420          425          430

Lys Ala Ile Asn Tyr Asp Asn Tyr Ala Lys Leu Val Phe Thr Gly Tyr
          435          440          445

Val Ala Asn Lys Gly Ser Gln Thr His Gln Phe Val Ile Ser Gly Ala
          450          455          460

Ser Phe Val Thr Ala Thr Leu Tyr Trp Asp Asn Ala Asn Ser Asp Leu
465          470          475          480

Asp Leu Tyr Leu Tyr Asp Pro Asn Gly Asn Gln Val Asp Tyr Ser Tyr
          485          490          495

Thr Ala Tyr Tyr Gly Phe Glu Lys Val Gly Tyr Tyr Asn Pro Thr Asp
          500          505          510

Gly Thr Trp Thr Ile Lys Val Val Ser Tyr Ser Gly Ser Ala Asn Tyr
          515          520          525

Gln Val Asp Val Val Ser Asp Gly Ser Leu Ser Gln Pro Gly Ser Ser
          530          535          540

Pro Ser Pro Gln Pro Glu Pro Thr Val Asp Ala Lys Thr Phe Gln Gly
545          550          555          560

```

Ser Asp His Tyr Tyr Asp Arg Ser Asp Thr Phe Thr Met Thr Val
 565 570 575
 Asn Ser Gly Ala Thr Lys Ile Thr Gly Asp Leu Val Phe Asp Thr Ser
 580 585 590
 Tyr His Asp Leu Asp Leu Tyr Leu Tyr Asp Pro Asn Gln Lys Leu Val
 595 600 605
 Asp Arg Ser Glu Ser Pro Asn Ser Tyr Glu His Val Glu Tyr Leu Thr
 610 615 620
 Pro Ala Pro Gly Thr Trp Tyr Phe Leu Val Tyr Ala Tyr Tyr Thr Tyr
 625 630 635 640
 Gly Trp Ala Tyr Tyr Glu Leu Thr Ala Lys Val Tyr Tyr Gly
 645 650

<210> 17
 <211> 25
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 17
 tctgaattcg tctttttctg tatgg

25

<210> 18
 <211> 20
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 18
 tgtactgctg gatccggcag

20

<210> 19
 <211> 30
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 19
 agaggcatgc gtatccatca gatttttgg

30

<210> 20
 <211> 20
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 20

agtgaacgga tacttggaac

20

<210> 21
 <211> 20
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 21
 gttccaagta tccgttcac

20

<210> 22
 <211> 12
 <212> PRT
 <213> Pyrococcus furiosus

<400> 22

Ala Glu Leu Glu Gly Leu Asp Glu Ser Ala Ala Gln
 1 5 10

<210> 23
 <211> 24
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<400> 23
 tcattgatcc accctctcct tttta

24

<210> 24
 <211> 46
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

<220>
 <221> misc_feature
 <222> (20)..(25)
 <223> n at positions 20-25 is a, c, g, or t.

<400> 24
 gtctgcgcag gctgccggan nnnnnatgaa ggggctgaaa gctctc

46

<210> 25
 <211> 49
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic

```

<220>
<221> misc_feature
<222> (22)..(27)
<223> n at positions 22-27 is a, c, g, or t.

<400> 25
gagagctttc agcccccttca tnnnnnttc ggcagcctgc gcagacatg      49

<210> 26
<211> 27
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 26
agaggggggat ccgtgagaag caaaaaa      27

<210> 27
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 27
gatgactagt aagtctctaa      20

<210> 28
<211> 20
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 28
aagcctgagg ttgttgctcc      20

<210> 29
<211> 29
<212> DNA
<213> Artificial

<220>
<223> Synthetic

<400> 29
gggcatgctc atgaacttcc aggctgtga      29

<210> 30
<211> 4
<212> PRT
<213> Artificial

```

<220>

<223> Synthetic

<400> 30

Ala Gly Gly Asn

1

<210> 31

<211> 382

<212> PRT

<213> Bacillus subtilis

<400> 31

Met Arg Gly Lys Lys Val Trp Ile Ser Leu Leu Phe Ala Leu Ala Leu
1 5 10 15Ile Phe Thr Met Ala Phe Gly Ser Thr Ser Ser Ala Gln Ala Ala Gly
20 25 30Lys Ser Asn Gly Glu Lys Lys Tyr Ile Val Gly Phe Lys Gln Thr Met
35 40 45Ser Thr Met Ser Ala Ala Lys Lys Asp Val Ile Ser Glu Lys Gly
50 55 60Gly Lys Val Gln Lys Gln Phe Lys Tyr Val Asp Ala Ala Ser Ala Thr
65 70 75 80Leu Asn Glu Lys Ala Val Lys Glu Leu Lys Lys Asp Pro Ser Val Ala
85 90 95Tyr Val Glu Glu Asp His Val Ala His Ala Tyr Ala Gln Ser Val Pro
100 105 110Tyr Gly Val Ser Gln Ile Lys Ala Pro Ala Leu His Ser Gln Gly Tyr
115 120 125Thr Gly Ser Asn Val Lys Val Ala Val Ile Asp Ser Gly Ile Asp Ser
130 135 140Ser His Pro Asp Leu Lys Val Ala Gly Gly Ala Ser Met Val Pro Ser
145 150 155 160Glu Thr Asn Pro Phe Gln Asp Asn Asn Ser His Gly Thr His Val Ala
165 170 175Gly Thr Val Ala Ala Leu Asn Asn Ser Ile Gly Val Leu Gly Val Ala
180 185 190Pro Ser Ala Ser Leu Tyr Ala Val Lys Val Leu Gly Ala Asp Gly Ser
195 200 205Gly Gln Tyr Ser Trp Ile Ile Asn Gly Ile Glu Trp Ala Ile Ala Asn
210 215 220Asn Met Asp Val Ile Asn Met Ser Leu Gly Gly Pro Ser Gly Ser Ala
225 230 235 240Ala Leu Lys Ala Ala Val Asp Lys Ala Val Ala Ser Gly Val Val Val
245 250 255

Val Ala Ala Gly Asn Glu Gly Thr Ser Gly Ser Ser Thr Val
260 265 270

Gly Tyr Pro Gly Lys Tyr Pro Ser Val Ile Ala Val Gly Ala Val Asp
275 280 285

Ser Ser Asn Gln Arg Ala Ser Phe Ser Ser Val Gly Pro Glu Leu Asp
290 295 300

Val Met Ala Pro Gly Val Ser Ile Gln Ser Thr Leu Pro Gly Asn Lys
305 310 315 320

Tyr Gly Ala Tyr Asn Gly Thr Ser Met Ala Ser Pro His Val Ala Gly
325 330 335

Ala Ala Ala Leu Ile Leu Ser Lys His Pro Asn Trp Thr Asn Thr Gln
340 345 350

Val Arg Ser Ser Leu Glu Asn Thr Thr Thr Lys Leu Gly Asp Ser Phe
355 360 365

Tyr Tyr Gly Lys Gly Leu Ile Asn Val Gln Ala Ala Gln
370 375 380

<210> 32
<211> 4
<212> PRT
<213> Artificial

<220>
<223> Synthetic

<220>
<221> misc_feature
<223> Residue 1 is modified by a succinyl group.

<220>
<221> misc_feature
<223> Residue 4 is modified by a 4-methylcoumarin-7-amide group.

<400> 32

Leu Leu Val Tyr
1

<210> 33
<211> 4
<212> PRT
<213> Artificial

<220>
<223> Synthetic

<220>
<221> misc_feature
<223> Residue 1 is modified by a succinyl group.

<220>
<221> misc_feature
<223> Residue 4 is modified by a p-nitroaniline group.

<400> 33

Ala Ala Pro Phe

1

209060.42506001